

Shaping attitudes towards mental illness: How type and source of a meme influence attitudes towards anxiety



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Abstract

The present study examined the effects of expert sources vs. non-expert sources and humorous vs. informative memes on reducing negative attitudes towards people with an anxiety disorder. Based on the Source Credibility Theory, the Elaboration Likelihood Model, and previous literature, it was hypothesized that expert sources and humor, serving as peripheral cues, would lead to a greater reduction of negative attitudes. A 2 x 2 between-subjects design was conducted with 121 participants that were randomly assigned to an experimental condition followed by a questionnaire. After exposure to the meme, participants were asked to rate their agreement to statements regarding negative attitudes, using a seven-point Likert Scale. After gathering all responses, data was analyzed using descriptive tests, several independent *t*-tests, and one two-way ANOVA. Results did not demonstrate significant main effects for either source type or meme type, nor a significant interaction. These findings indicate that the use of memes, regardless of the source or tone, might not be an effective strategy to reduce negative attitudes towards people with anxiety. Limitations and future implications were discussed.

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Introduction

Digital communication platforms such as social media are becoming increasingly popular, not only in everyday and professional life but also in the context of health communication (Occa et al., 2024). Consequently, health organizations are now seizing their opportunity because disseminating health information on social media is both cost-effective and capable of reaching a large audience (Occa et al., 2024).

One important form of communication on social media is the meme. A meme used to be defined as a single cultural unit, but Shifman (2013) redefined meme as ‘a group of digital items sharing common characteristics of content, form, and/or stance.’ Memes typically combine images and text and are based on familiar situations. The visual component attracts attention while the text clarifies or adds humor to the message (Shifman, 2013).

During the last years, memes have increasingly been used to disseminate information about health-related topics, including mental health issues such as anxiety (Occa et al., 2024). This trend shows a growing effort to challenge negative attitudes people might hold about different mental illnesses and change public perceptions of mental health illnesses by means of digital communication.

Mememes can differ substantially in their content; some mememes are informative, and others use humor. Humorous mememes can reduce resistance against a certain topic about mental health. On the other hand, caution should be used with humor in messages because it quickly oversimplifies a complex topic such as mental health (Blanc & Brigaud, 2014). Informative mememes can be effective to influence attitudes, but they are less attractive and motivating to read for the audience (Nabi et al., 2007). Another factor that could influence attitudes is the source. The perception of credibility highly influences how strong the message is conveyed (Hovland et al., 1953). An expert source (e.g., psychologist, health organization) is often seen as more credible than a non-expert source (e.g., influencer) (Fernandez, 2024).

Currently, anxiety is the most common mental health illness (Meyer, 2015). Anxiety is a future-orientated mood state associated with preparation for possible, upcoming negative events (Craske et al. 2011). Individuals struggling with it experience emotions that are characterized by different feelings, such as tension and worry, but it also impacts their physiques with, for example, an increased blood pressure and muscle tension (American Psychological Association, n.d.).

Research shows that people still hold negative views about mental illnesses like anxiety (Wood et al., 2014). Those struggling with these issues are often unfairly blamed for their

condition and seen as unlikely to get better. These attitudes can be deeply harmful; they can lead to people being excluded at work or in social settings and make it harder for them to reach out for help (Corrigan & Watson, 2002). When people feel safe to talk about their anxiety, they are more likely to get diagnosed and treated, which leads to better healthcare and support overall (Corrigan & Watson, 2002). It is important to understand how memes about mental health are interpreted by the public, as this might help in campaigns on mental health awareness.

Although previous literature explored the effects of content style (humor vs. informational) and source credibility separately for traditional media, little is known about how these characteristics work together in memes to reduce negative attitudes towards people with anxiety. Investigating these factors is an interesting topic since this could indicate which style of communication in memes about anxiety and what kind of sources might be effective to reduce negative attitudes from the public. Therefore, the current study poses the research question:

RQ: What are the effects of memes with an expert source vs. a non-expert source and humorous memes vs. informative memes on reducing negative attitudes towards people that struggle with anxiety disorders?

Theoretical framework

Memes and mental health

Mental health is defined as a state of well-being in which individuals can cope with the stresses of life, realize their abilities, work and learn, and contribute to their communities (World Health Organization, 2022). Mental health problems are experienced differently by each person. With varying levels of difficulty and distress and potentially very different social and clinical consequences (World Health Organization, 2022). Individuals that experience mental health issues and are confronted with varying conditions, these conditions are often chronic and have an impact on several aspects of their daily life: interpersonal relationships, academic and professional development, and overall quality of life (World Health Organization, 2022).

As noted earlier, negative views about people with a mental health illness are still common among the public and could negatively impact individuals struggling with one (Corrigan & Watson, 2002). For this reason, creating more awareness for this topic has been identified as an urgent priority to improve the lives of people with a mental illness (Livingston et al., 2012). Social media as well as memes could be a promising strategy to counter these negative views (Occa et al., 2024). Memes can be found on social media on different kinds of platforms such as Facebook, X, Instagram, TikTok, etc., where people can share, exchange, and create numerous forms of digital content (Naslund et al., 2020). The portrayal of mental illnesses in the media significantly influences the understanding of them and gives meaningful insights into the attitudes regarding these conditions (Wagner & Temmann, 2025). Wagner & Temman (2025) highlight that both public and individual perceptions about mental health issues and people living with them are influenced by the way mental illness is represented and discussed in social media memes. A total of five characteristics of depression memes had been found by Wagner & Temman (2025). Firstly, memes regarding mental illnesses depict the emotionally exhausting experiences of living with a mental illness. Second, mental health disorders were depicted as uncontrollable and unchangeable conditions. Third, people affected by a mental health disorder were portrayed as being overpowered, controlled, and manipulated by their disorder. The fourth characteristic regards the ineffectiveness of coping skills and treatment options for mental health illnesses. And lastly, depression memes challenge common misconceptions about mental illness. These characteristics might be

problematic, as these depression memes may reinforce harmful perceptions of mental illness and individuals affected by it (Wagner & Temman, 2025).

On the other hand, Occa et al. (2024) suggest that social media memes may be employed in campaigns for mental health issues as an essential piece to integrate larger campaign efforts. Memes regarding mental health can contribute a considerable amount to making controversial and difficult topics such as these more discussable (Occa et al., 2024). Consequently, with time, these memes might change public perceptions and attitudes about mental health issues and people struggling with them (Robb-Dover, 2025).

Expert source vs. non-expert source

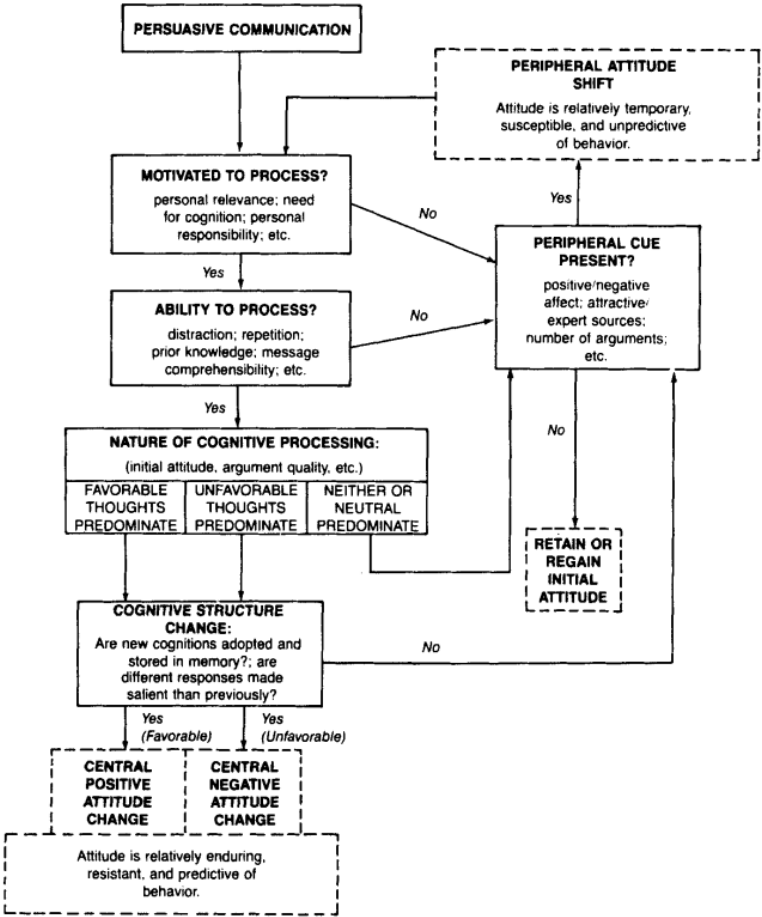
Memos are typically created by individuals who are active on social media platforms, often for recreational purposes. These creators generally do not possess a large amount of subject-specific knowledge, nor do they have any experience related to the topic depicted in the meme. Therefore, these sources are non-expert sources, as they lack the qualifications and expertise typically required to provide authoritative information (Caley et al., 2014). In contrast, expert sources consist of individuals or institutions with a significant level of knowledge in a particular field (Caley et al., 2014). As noted by Caley et al. (2014), experts are recognized by peers within their discipline, possess years of relevant experience, and have an academic background related to their area of expertise.

The type of source in a message may influence changes in attitudes, and it also influences the source's credibility (Wilson & Sherrel, 1993). Credibility is defined as a person's perception of the truth of a piece of information (Umeogu, 2012). A theory that explains the credibility of a source is the Source Credibility Theory (Hovland et al., 1953). This theory states that the endorsers' credibility can affect recipients' beliefs, attitudes, and behaviors towards the topics that are being communicated (Serman & Sims, 2023). The theory defines expertise as a main component. Hovland et al. (1953) describe it as the degree to which the source is perceived as knowledgeable in a specific field. As a result, a meme from an expert source, according to this theory, should be more believable and more effective in shaping attitudes than a non-expert source (Hovland et al., 1953). In other words, expertise plays a fundamental role in how memes are interpreted but also in how they influence attitudes.

This process aligns with the Elaboration Likelihood Model (ELM), which is a framework that can be used to explain how an attitude can be changed by certain messages

and their features (Cacioppo & Petty, 1986). A schematic representation of the ELM can be found in figure 1. Memes are typically consumed in low-effort, informal settings, where people quickly scroll past content and barely engage with it (Kuznetsov & Soldatkina, 2017). As a result, audiences are more likely to follow the peripheral route, making them sensitive to heuristic cues such as an expert source (Kuznetsov & Soldatkina, 2017). As mentioned earlier, the Source Credibility Theory states that perceived expertise influences the credibility of the message. Therefore, the expertise of the source serves as a powerful peripheral cue that could influence attitudes with low cognitive effort (Cacioppo & Petty, 1986).

Figure 1
The Elaboration Likelihood Model by Cacioppo & Petty (1986)



A study on the positive effects of expert sources, is the research done by Hovland & Weiss (1951), where they compared credible and non-credible sources using the same message to test if these factors could influence opinion change. The outcomes confirmed the assumption that credible sources had a greater impact on opinion change than non-credible sources (Hovland & Weiss, 1951).

Wasike (2022) conducted a study on the credibility and persuasiveness of COVID-19 memes. Wasike (2022) did this by presenting memes to participants in which the content was either pro- or anti-mask/vaccination and from an expert source or a non-expert source. The results demonstrated that memes from an expert source were more likely to be believed and shared (Wasike, 2022). In addition, the analysis showed that there was a positive correlation between the credibility and the persuasiveness of a meme, which in this case, according to the Source Credibility Theory and the ELM, may also impact attitudes. In the conclusion section, it was mentioned that meme-based social media campaigns with an expert source might be an effective way of communication for health campaigns. These results can be taken into consideration for the current study.

Another study conducted by Fernandez (2024) on the credibility of messages that have an expert source (Professor Author) versus a non-expert source (Student Author and ChatGPT) showed similar results. The findings demonstrated that participants rated Professor Author as more trustworthy and credible than Student Author and ChatGPT. Hence, again, results showed that the messages with an expert are rated as more credible and trustworthy (Fernandez, 2024).

Additional research by (Lin et al., 2016) about drug-resistant gonorrhoea found that messages from an expert source generated the highest perceived credibility compared to peer or stranger sources. This finding confirms that source expertise, in low-effort contexts such as social media, serves as a peripheral cue increasing the perceived credibility. As both the ELM and Source Credibility Theory propose, this perceived credibility of the source can lead to attitude changes (Hovland et al., 1953; Cacioppo & Petty, 1986). Although the study of Lin et al. (2016) concentrated on tweets, the context is similar to the current study, which uses another social media-based means of communication: memes.

Despite the fact that several studies have investigated source credibility and trustworthiness in communication, the effects of attitudes towards people with anxiety remain an unexplored topic. Based on the ELM, when the content of a meme is processed superficially, the presence of an expert source can lead to stronger attitude change compared to memes by non-expert sources. Additionally, analyzing the results of the studies earlier referred to, it has been found that expert sources are perceived as more credible, trustworthy, and persuasive. This could indicate that expert sources might as well have an influence on attitudes (Wasike, 2022; Fernandez, 2024; Hovland & Weiss, 1951; Lin et al., 2016). For these reasons, the following hypothesis is formulated:

H1: Expert sources will lead to a greater reduction of negative attitudes towards people that struggle with anxiety disorders than non-expert sources.

Humorous memes vs. informative memes

The information and content that are communicated may also influence attitudes. Humor is a feature often found in memes (Yang, 2022), and humor as a communication strategy is becoming more popular as social media is becoming progressively more important in communicating about health issues (Lee et al. 2015). Humor has three positive abilities when it comes to communication: it increases attention to a message, it increases source liking, and it may reduce bias (Lee et al., 2015). However, on the other hand, humor also has downsides. For example, it can estrange people who ‘do not get the joke’, and it might also establish problematic stereotypes (Yeo et al., 2021) Furthermore, it quickly oversimplifies a complex topic such as mental health (Blanc & Brigaud, 2014). Nabi et al. (2007) add to this that, given the nature of a humorous message, the public will probably see a humorous message as less relevant than an informative message.

According to the ELM, as already mentioned, memes are typically processed in low-effort and informal settings. Therefore, viewers’ motivation to deeply process the meme may decrease, leading to the peripheral route (Cacioppo & Petty, 1986). In the context of the peripheral route, humor serves as a heuristic cue (Cacioppo & Petty, 1986). Humor evokes positive emotions and increases the attractiveness of the meme; this in turn increases the chance of a positive attitude towards the topic (Cacioppo & Petty, 1986).

The study of Nabi et al. (2007) found a significant positive relationship between the perceived humor of a message and the degree to which participants were motivated to process the message in more detail. Subsequently, they investigated if this in turn influenced participants' attitudes. Participants were exposed to four different humorous texts on social debates. Before they read the text, they were asked about their initial attitude towards the social issue. After exposure to the message, the participants answered questions regarding their attitudes towards the message. Results demonstrated that humorous messages were observed to be more persuasive than informative messages, which might as well lead to attitude change (Nabi et al., 2007). Nevertheless, the findings did not support their third hypothesis, which states that meaningful attitude change in response to a comedic message will emerge in the short run. Correlation analyses did not show a significant result for this hypothesis (Nabi et al., 2007). On the other hand, the analyses of the four messages separately

demonstrated that the associations of perceived humor and attitudes fall within the confidence interval (Nabi et al., 2007). From this, the authors concluded that sometimes humor may have a small direct association with positive attitude change (Nabi et al., 2007).

Other findings in favor of the use of humor in healthcare messages were found in the study of Blanc & Brigaud (2014); they presented participants with humorous and non-humorous health messages. A survey was conducted to measure the participants' attitudes towards the messages. They found that the presence of humor in a message led to a positive attitude towards the health message. This result led the researchers to conclude that the presence of humor is a promising strategy for health communication to change attitudes positively (Blanc & Brigaud, 2014). To add to this, Yang (2022) put focus on the effect of humor but specifically in memes. The findings demonstrated that using a humorous meme vs. a serious meme in a brand-related Twitter post increased the perceived humor of participants, which led to more positive attitudes towards the message (Yang, 2022).

On the other hand, a related study by Esco et al. (2023) revealed that humorous memes may not be an effective strategy of communication in memes about depression. They investigated the personal and perceived attitude towards depression and the frequency of the participant's interactions with memes expressing depression in the Philippines. The results were obtained by means of a questionnaire; further statistical analyses implied that participants prefer to interact with memes that contain serious information rather than humorous information. The authors assumed that this outcome might be due to the tabooing of depression in the Philippines (Esco et al., 2023). Regarding attitudes, the study of Baumeister & Fischer (2021) tested the effects of humor on organ donation attitudes. Participants were exposed to humorous messages and neutral messages. Results demonstrated that the use of humor in a message was perceived as more entertaining, but the effects on attitudes towards organ donation were limited. In other words, humor did not have a significantly larger effect on attitudes related to donor donation than neutral messages (Baumeister & Fischer, 2021).

The contradicting findings on humor as a communication style indicate that this topic must be further explored. Nevertheless, the majority of studies agree that humor is a recognized potential of communication to make a topic more accessible, attract more attention to the message, and generate favorable attitude changes. Furthermore, the ELM assumes that memes are processed through the peripheral route, to which humor is a heuristic cue (Hong & Low, 2023). Humor in memes can enhance message receptivity by creating a positive

emotional response, which might facilitate attitude change (Akram & Drabble, 2022). For these reasons, the second hypothesis for this study is guided by the following statement:

H2: Humorous memes will lead to a greater reduction of negative attitudes towards people that struggle with anxiety disorders compared to informative memes.

Interaction between meme type and source type

It is interesting to investigate if there is an interaction between the type of meme (humorous vs. informative) and the source type (expert vs. non-expert) on negative attitudes towards people with an anxiety disorder. This could provide more insight into how health-related memes can effectively reduce negative attitudes depending on their content and the source by which they are conveyed.

From a theoretical perspective, according to the ELM, humor normally serves as a peripheral cue, and it may be more effective when presented with another peripheral cue: an expert source. Because it combines emotional appeal from the humorousness and credibility from the expertise of the source (Cacioppo & Petty, 1986).

Nabi et al. (2007) discovered that there was a significant relation between the perceived humor of a message and source credibility; consequently, this had an impact on participants' attitudes. They tested participants' attitudes by comparing the outcomes after participants were exposed to a humorous or a serious message that was accompanied by two different types of sources: a humorous source (the comedian Chris Rock) or an anonymous/neutral source. Results revealed that the humor-attitude association was relatively small (Nabi et al., 2007). Only the humorous message with Chris Rock as a source influenced attitude change, the other conditions did not have an effect (Nabi et al., 2007). From these outcomes, the conclusion was made that the combination of a humorous message and a humorous source (comedian) leads to positive attitude change (Nabi et al., 2007).

Another line of research concentrated on the effects of humor in science communication on social media. The outcomes revealed that participants that were presented with one of the three humorous conditions rated the source (scientist) as more likeable than participants who were presented with the informational condition (Yeo et al., 2021). This in turn led to the audience having a more positive attitude regarding following science content pages on social media (Yeo et al., 2021).

Both studies indicate that humor either increases the credibility and/or the likeability of the source and that increased credibility and likeability in turn influence attitudes.

Nevertheless, this does not indicate an interaction but a mediation effect. Despite the theoretical assumptions from the ELM, there remains a lack of empirical evidence on examining an interaction between meme type and source type on negative attitudes towards people with anxiety. Most of the existing research focused on one of the two variables independently rather than investigating a possible interaction. For this reason, there is not enough evidence to bolster a specific hypothesis on this interaction. Therefore, the following research question is formed:

RQ1: Is there an interaction between meme type and source type on negative attitudes towards people with anxiety disorders?

Methodology

Design

This research followed a quantitative experimental approach with a 2 x 2 between-subject factorial design. The experiment measured the effects of meme type (humorous vs. informative) and source type (expert vs. non-expert) on reducing negative attitudes towards people with anxiety disorders. A total of four conditions were created for this experiment: 1. humorous and expert source, 2. humorous and non-expert source, 3. informative and expert source, 4. informative and non-expert source. The main effects of the two independent variables were measured as well as the possible interaction between the type of meme and source type on reducing negative attitudes.

Materials

To manipulate the meme type condition, a humorous meme and an informative meme were created. For the type of source, the distinction was made between an expert source and a non-expert source.

All memes involved content about the topic of anxiety and were created to resemble an Instagram post. They included a picture, a short text within the picture, a caption, and lastly the account of the source was visible at the top of the Instagram post and in front of the caption. An overview of the four meme conditions can be found in Appendix B.

The humorous and the informative memes used the same image, layout, and format to ensure the validity. They differed in the text of the meme and the source. The humorous meme contained a lighthearted text referring to an experience that people with anxiety can relate to: ‘When you think... the fifth time you turned off the oven may have actually turned it back on!’. The informative meme included statistical information about anxiety: ‘When you realize... you are one of the 15% of the Dutch population that suffers from an anxiety disorder!’. The meme with an expert source was attributed to the World Health Organization since this is an organization with acknowledged expertise. The non-expert source was a non-existent Instagram page, for which the researchers created the name ‘meme.anxiety’.

A pre-test was created to determine whether participants were able to distinguish between the different experimental conditions, meme type, and source type. A total of 16 individuals took part in the pre-test. These participants were not involved in the main survey. Each participant was exposed to two memes: one informative and one humorous. Both memes were accompanied by the same source (either expert or non-expert), resulting in two pre-test

groups. The main goal of this pre-test was to examine whether the difference between humorous and informative memes was recognized, as this manipulation was expected to be more subtle than source type. Participants viewed two memes and answered questions after each meme using a seven-point Likert scale regarding their perception of humorousness and informativeness in the meme and their perceived credibility and trustworthiness of the source.

After gathering the data of the pre-test, several independent samples *t*-tests were conducted. The independent samples *t*-test showed a difference between humorous memes and informative memes on perceived humorousness. This difference 1.8, 95% CI [0.68, 3.07], was significant ($t(30) = 3.21, p = .003$) and represented a large effect $d = 1.65$. It was found that participants perceived the humorous condition ($M = 4.7, SD = 1.7$) as more humorous than the informative meme ($M = 2.8, SD = 1.6$). On the other hand, an independent sample *t*-test did not show a significant difference for perceived informativeness between the informative condition ($M = 4.6, SD = 1.8$) and the humorous condition ($M = 3.4, SD = 2.0$) ($t(29.63) = -1.69, p = .104$). For the analysis of the source type, two independent samples *t*-test were conducted but did not show a significant difference between the expert source ($M = 3.5, SD = 1.8$) and non-expert source ($M = 3.9, SD = 1.3$) on trustworthiness ($t(27.80) = 0.78, p = .440$). The independent samples *t*-test also did not find a significant difference between expert source ($M = 3.7, SD = 1.9$) and non-expert source ($M = 3.4, SD = 1.8$) on credibility ($t(29.91) = -0.39, p = .703$). For this reason, instead of only naming the source at the top of the meme post and in front of the caption, a biography with a short text was added to the meme.

Participants

It was important to find participants that have some form of knowledge about social media and memes to understand the memes that were presented. Most previous research on topics regarding memes used a sample of participants between the ages of 18 and 35 (Naslund et al., 2020; Heffer et al., 2019). Therefore, this age range was appropriate for this study. Participants differed in their sociodemographic factors such as age, gender, and educational level.

The subjects were recruited through the researchers' (social) networks. After removing all invalid responses from the data set, a total of $n = 121$ participants remained. Table 1 represents the gender distribution among the participants. 88 were female (73%), 28 were male (23%), 3 were nonbinary/third gender (3%), 1 person did not want to say their gender (less than 1%) and 1 person wanted to describe themselves as a trans woman (less than 1%). Most participants hold an upper secondary school education ($n = 64, 53%$), followed by a

bachelor’s degree ($n=43$, 36%), a master’s degree ($n=10\%$) was the third most common education level, the fourth was lower secondary school ($n=4\%$) and lastly, only one participant had no formal education ($n=1$, less than 1%). The ages of participants ranged between 18 and 55 years old with a mean of 23.32 years, one participant did not indicate their age. Some participants were older than the age range; nevertheless, they were still included in the study. Two Chi-Square tests for gender and education level and a one-way ANOVA were conducted to measure the distribution of participants over the four conditions. All tests revealed non-significant results, and this indicated that participants were equally distributed in terms of gender ($\chi^2(12) = 12.91, p = .376$), education ($\chi^2(12) = 9.07, p = .697$), and age ($F(3, 116) = 7.14, p = .870$).

Additional questions regarding prior exposure to and knowledge of anxiety on Instagram were assessed through descriptive tests. Most participants were already familiar with anxiety and its symptoms ($n= 106$, 88%) and 15 participants were not (12%). On average, participants indicated that they use Instagram often to frequently ($M=5.4, SD= 1.5$). For the last question about how often they encounter health-related content on social media, participants answered that they sometimes get exposed to health-related content ($M=4.0, SD= 1.4$).

Informed consent was obtained from each participant, who was made aware that their participation was voluntary and that they could withdraw at any time. Participants were also informed about how their data would be used, stored, and protected. Additionally, they were provided with information regarding their rights, including confidentiality and the right to access or request the removal of their data.

Table 1

Gender distribution of participants

Gender	N	Percent
Female	88	73%
Male	28	23%
Non-binary/third gender	3	3%
Prefer not to say	1	< 1%
Prefer to self-describe	1	< 1%
Total	121	100%

Instruments

Data were collected using an online survey that was carried out by Qualtrics. It was designed to assess participants' prior knowledge about anxiety and prior exposure on social media, perceived humor and perceived informativeness of the meme, as well as to measure the credibility of the source. Lastly, the participants' attitudes towards people with anxiety were assessed.

The prior knowledge question regarding anxiety entailed one item with a 'yes' or 'no' question: "Are you familiar with anxiety and its symptoms?". The prior exposure on social media was measured with two questions on a seven-point Likert Scale (1= never, 7= always). The questions were "How often do you use Instagram?" and "How often do you encounter health-related content on social media?".

All items regarding perceived humor, informativeness, credibility of the source, and attitudes were measured on a seven-point Likert scale (1=strongly disagree, 7= strongly agree). One item was presented to test the perceived humor of the meme: "I find this meme funny". The perceived informativeness was measured with two statements: "This post was informational" and "The information of this meme was clear and educational."

Two items were used to measure source credibility: "The creator of this post seems knowledgeable about anxiety" and "I would trust this creator to provide accurate mental health information."

A total of four items were employed in the survey to measure the negative attitudes towards people with anxiety, these were derived from the study of Wood et al. (2014). The following statements have been used: "People that struggle with anxiety are a danger to others", "People with anxiety are unpredictable", "People with anxiety are hard to talk with", and lastly "People with anxiety feel different from the way we feel at times". Higher scores would indicate more negative attitudes, meaning lower scores indicate a more positive effect on negative attitudes toward people with anxiety. A reliability analysis was conducted to measure the internal consistency of the four items. The analysis measured a Cronbach's Alpha of $\alpha = .64$, which is below the acceptable value of $\alpha = .70$. However, this is still in an acceptable range, therefore, the mean index of the four items will be used in the following analyses.

Procedure

Before beginning the survey, participants first received a brief introduction outlining the purpose of the study and what their participation would involve. They were informed that

their data would be used for research purposes and that participation was voluntary. Informed consent was obtained before proceeding.

The survey was conducted using Qualtrics and took between 5 and 10 minutes to finish. Following consent, participants completed a short set of demographic questions regarding their age, gender, and education level. The survey then proceeded with a few previous knowledge questions about anxiety, whether they are active on social media, and how often they encounter health-related content on these platforms. They were then randomly assigned to observe one of the four memes representing a combination of the two experimental conditions: type of meme (humorous vs. informative) and source type (expert vs. non-expert). The meme was presented on screen, and participants were instructed to look at it for as long as they wished before continuing.

After they were done looking at the meme, the survey continued with several statements that were assigned to assess the perceived humorousness and informativeness, the credibility of the source, and their negative attitudes towards individuals with anxiety.

When participants completed the survey, they were debriefed about the study's aims and thanked for their participation.

Data analysis

A total of three independent samples *t*-tests were conducted for the manipulation check. The tests measured the perceived humorousness, informativeness and source credibility of the different conditions. Since this study had two categorical independent variables and used quantitative interval data, a two-way ANOVA had been run in the statistical program SPSS. By doing this, it was possible to test the effects of expert vs. non-expert sources and meme type on attitudes and to find a potential interaction between these two independent variables on attitudes.

Results

This study examined the difference between humorous memes and informative memes and the difference between an expert source and a non-expert source on attitudes. Besides that, a possible interaction between meme type and source type was also investigated. The SPSS output of the statistical tests can be found in Appendix D.

First, the effectiveness of the humorous and informative manipulations was measured by means of several independent samples *t*-tests. An independent samples *t*-test with 'meme type' as a factor showed a significant effect for perceived humorousness ($t(119) = -2.52, p = .013$). This mean difference of -0.68, 95% CI [-1.12, -1.46], between humorous memes ($M = 4.3, SD = 1.5$) and informative memes ($M = 3.6, SD = 1.5$) was found to be significant and represented a small effect $d = -0.46$. However, the independent samples *t*-test with humorous memes ($M = 4.3, SD = 1.3$) and informative memes ($M = 4.8, SD = 1.2$) as factors on perceived informativeness was not significant ($t(119) = 1.94, p = .055$).

The perceived source credibility of the source was also measured with an independent samples *t*-test. The test showed a significant mean difference of 1.31, 95% CI [0.84, 1.79] between the expert source ($M = 4.9, SD = 1.4$) and the non-expert source ($M = 3.5, SD = 1.3$) on perceived source credibility ($t(119) = 5.26, p < .001$) with a large effect of $d = 1.01$.

The effects of meme type and source type on negative attitudes towards people with anxiety were measured by means of a two-way ANOVA. The two-way ANOVA also measured the interaction between meme type and source type on attitudes. The two-way analysis of variance with meme type and source type as factors did not reveal a significant main effect for meme type on negative attitudes towards people with anxiety ($F(1, 117) = 0.83, p = .363$). Humorous memes ($M = 3.0, SD = 1.0$) were not found to be more effective than informative memes ($M = 3.2, SD = 1.0$) in reducing negative attitudes. It also appeared from the outcomes of the test that the type of source did not have a significant influence on negative attitudes towards people with anxiety ($F(1, 117) = 0.85, p = .358$). This indicates that expert sources ($M = 3.0, SD = 1.0$) do not have a bigger effect on reducing negative attitudes than non-expert sources ($M = 3.2, SD = 1.0$). Lastly, the interaction between meme type and source type was not statistically significant ($F(1, 117) = 2.72, p = .102$).

Conclusion

The purpose of this study was to examine whether humorous memes or informative memes lead to a greater reduction of negative attitudes towards people with anxiety, as well as to investigate the influence of the type of source on these attitudes. The research question this thesis intended to answer was, ‘What are the effects of humorous memes vs. informative memes and memes with an expert source vs. a non-expert source on negative attitudes towards people that struggle with anxiety disorders?’

The first independent variable of this experiment was source type. The outcomes of the two-way ANOVA did not show any significant difference between an expert source and a non-expert source on negative attitudes towards people with anxiety. Participants tended to give low scores to the negative statements regardless of the type of source. This suggests that most participants did not strongly agree with the negative statements about people with anxiety. In other words, the findings do not provide evidence for the first hypothesis, and therefore H1 needs to be rejected. Consequently, it cannot be concluded that expert sources are more effective at reducing negative attitudes towards people that struggle with anxiety.

Continuing with meme type, there was no significant finding for the effect of meme type on negative attitudes towards people that struggle with anxiety. Therefore, the second hypothesis (H2) needs to be rejected. This states that humorous memes will lead to a greater reduction of negative attitudes than informative memes. Again, regardless of the meme type, on average, participants tended to give lower scores for the negative statements. As a result, it seems that the type of meme does not make a meaningful difference in reducing these negative attitudes.

Additionally, the results did not demonstrate a significant interaction effect between the type of source and type of meme on negative attitudes towards people with anxiety. Therefore, in response to the sub-question (RQ1) of this thesis, there is no interaction effect found for the type of source and type of meme. It can be concluded that combining different meme types with an expert or non-expert source does not lead to a combined effect on reducing negative attitudes towards people with anxiety.

This leads to the conclusion that there is no evidence for the effects of source type and meme type on reducing negative attitudes towards people that struggle with anxiety. This suggests that neither the expertise of the source (expert vs. non-expert) nor the tone of a meme (humorous vs. informative), significantly influences such negative attitudes.

Discussion

The present study aimed to examine the effects of source type and meme type on reducing negative attitudes towards people with anxiety. Contrary to expectations, the results did not reveal any significant main effects or interaction effects. This section discusses several possible explanations for these findings and how they relate to the theories and literature earlier referred to.

A possible overall explanation for these insignificant results could be the fact that participants, in general, already showed low agreement to the negative statements about people with anxiety disorders. This could possibly have led to a lack of space for further reduction of negative attitudes. The different conditions of this experiment might have been less effective when attitudes were already relatively positive or neutral. The age range of this thesis might explain this: young people are more likely to be more open and aware of mental health problems, explaining why overall attitudes were already fairly positive.

There was no main effect found for the source type on negative attitudes, leading to the rejection of the first hypothesis (H1). Despite the presence of an expert-source in the meme, it did not lead to a reduction in negative attitudes. These findings are not in line with the findings of Wasike (2022), where it was found that expert sources elicit more engagement and were more likely to be believed, which in turn might influence attitudes. Possible explanations for this difference could be explained by the content in the memes. During the time of Wasike's study (2022), COVID was a highly salient and politicized issue. Participants may have been more motivated to search for credible and expert information. Anxiety, while it is still an important topic, is often perceived as a personal topic. Therefore, viewers might not seek or prioritize expertise in this context. Furthermore, COVID memes might have triggered more public concern, which can increase the reliance on an expert source as a cue, while memes about anxiety might evoke personal emotions; this could lead to participants to judge the meme based on their own judgment rather than the source. From the perspective of the ELM, memes are normally processed via the peripheral route. Therefore, viewers rely more on heuristic cues like source expertise. However, in this study, the expert source condition may not have been persuasive enough within the meme format to significantly influence attitudes, unlike in studies using more formal text-based messages that encourage central route processing (Fernandez, 2024; Hovland & Weiss, 1951).

It was expected that humorous memes would have a greater influence on reducing negative attitudes towards people with an anxiety disorder. However, it was found that the

type of meme did not demonstrate a meaningful effect for this. Therefore, the second hypothesis (H2) was rejected. This finding is contradictory to the findings of Blanc & Brigaud (2014), Yang (2022), and Nabi et al. (2007), as they found that humor has a positive effect on attitudes. However, these studies focused on the attitudes towards the message itself, while the present study focused on entrenched negative attitudes towards people with anxiety. In other words, humor might have an impact on attitudes towards the post but not on negative attitudes regarding individuals with anxiety disorders. From a theoretical perspective, although memes are often processed via the peripheral route, according to the ELM (Cacioppo & Petty, 1986), and humor acts as a peripheral cue here, no effect was found for humor in this study. Humor can enhance empathy, confidence, and a cheerful mood; however, this might be too superficial to change negative attitudes. This may suggest that the influence on attitude change on such topics may be more effective via the central route, as the influence on attitudes through the central route is more powerful and enduring (Cacioppo & Petty, 1986). A study by Moyer-Gusé et al. (2011) illustrates the importance of the central route when communicating about complex topics. The outcomes revealed that humor, which served as a peripheral cue in a message about safe sex, reduced critical thinking; consequently, participants misunderstood the message. As a result, participants that were exposed to the humorous message were more inclined to engage in unprotected sex, while participants exposed to the informative message, following the central route, did not show this effect (Moyer-Gusé et al., 2011). Memes, as short and superficial messages, may offer too little depth of content to elicit this central processing, limiting their impact on negative attitudes.

It was revealed that the interaction effect between meme type and source type was not significant. It was already proven that meme type and source type by themselves did not show a significant result. Hence, these outcomes might explain this insignificant interaction effect. Furthermore, as already noted, attitudes, especially those regarding sensitive and controversial topics, are often difficult to influence; thus, one-time and short exposure with the combination of meme type and source type might not have a sufficiently strong effect.

Limitations and future recommendations

A few limitations of this thesis should be acknowledged. First, although the intended age range was 18 to 35, most participants were between 20 and 25 years old. As a result, the findings may not be fully generalizable to the broader age group, particularly individuals at the younger and older ends of the range. Another important limitation of this thesis concerns

the low internal consistency (Cronbach's Alpha $\alpha < .70$) of the four-item scale for negative attitudes. While these items were based on previous research from Wood et al. (2014), the limited number could possibly have reduced the internal consistency of the scale and may have limited the scale's ability to fully reflect the different aspects of negative attitudes towards people with anxiety.

For future research, it is advisable to aim for a more balanced distribution across the age range or even include older adults as well. It may also be interesting to compare different age groups to assess whether attitudes towards anxiety-related memes differ by age. Different generations might interpret memes in different ways. Future studies might also explore how the role of frequent exposure to social media influences these responses to negative statements regarding people with anxiety. Lastly, future research should consider expanding the scale to measure negative attitudes to improve measurement reliability.

Theoretical and practical implications

Theoretically, the results suggest that peripheral cues such as humor and an expert source, as described according to the ELM (Cacioppo & Petty, 1986), may not be sufficient to change or reduce deep-seated negative attitudes towards people with anxiety. Rather, this suggests that attitude change requires the central route, involving more argumentation and engagement.

For practical purposes, this means that memes, as accessible and popular as they are, may not be an effective communication tool to reduce negative attitudes towards people with anxiety. This implies that future campaigns regarding anxiety, should aim to evoke more profound and empathetic engagement by, e.g. presenting a narrative or personal story. In this way sensitive topics such as anxiety are processed with deeper engagement, leading to more meaningful attitude change.

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Appendix A

The survey

Information form

INFORMATION ABOUT THE RESEARCH STUDY

The influence of memes in mental health communication

Thank you very much for taking the time to help us with this study!

Introduction

We would like to invite you to participate in a research study. Participation is voluntary. Before you decide whether or not to take part, we will give you information about the study. Please take time to read the information carefully. If something is not clear, or you would like more information, please ask the researcher. The contact details can be found at the bottom of this letter.

Outline and aim of the research study

Memes have become a popular communication tool on social media in the last years. This bachelor thesis wants to investigate memes on the topic of mental health and anxiety.

Who is conducting the research study?

This research is conducted by Anne Pragt, Annabel Raven, Fleur de Reeper, Eef Houben, Isra Wahid and Viktoria Schulz, bachelor's thesis International Business Communication at Radboud University. Supervisor: Dr. Anna Wagner, Assistant Professor at the Centre for Language Studies, Faculty of Arts.

What does participation in the study entail?

In this study, you will be asked to participate in an online survey. The survey consists of an online questionnaire that takes between 5-10 minutes of your time. First, you will be asked a few general questions such as your age and gender. Next, you will be presented with a meme, after which the survey will proceed with several questions about your perceptions of the meme.

Voluntary participation

Your participation in this research is voluntary. This means that you can stop your participation and withdraw your consent at any time during the study, without giving a reason. Withdrawing from or stopping participation will not have any adverse consequences for you.

What data do we collect and how do we handle it?

In this study we collect research data. These will be used for scientific purposes only. The data will be collected anonymously, since we will not ask for your name, email address, phone number or other personal information.

Our research data may be of interest to other scientific research. The anonymized research data will therefore be available to other scientists for at least 10 years. Because the research data are anonymous, they cannot be traced back to you.

Access for control purposes

Some persons need to have access to your research data. This is necessary to check whether the data have been stored in accordance with the rules. Persons who carry out this check are, for example, the data officer and designated data management staff at Radboud University. They will keep your data confidential.

Your consent

Your data may only be used for our study if you give permission for this in the consent form. Since the survey is anonymous and your data cannot be traced back to you individually, it is not possible to withdraw your consent or have your responses deleted after participating in the study.

Do you have any questions?

If you have any questions or would like more information about the research study, please contact Dr. Anna Wagner (anna.wagner@ru.nl). For other questions about this study (e.g. data processing), please contact privacy@let.ru.nl

Ethical assessment and complaints

Should you have any complaints regarding this research, please contact the researcher.

You can also file a complaint with the secretary of the Ethics Assessment Committee Humanities of Radboud University (etc-gw@ru.nl).

Consent form

If you want to participate in this research study, we ask you to sign the consent form. With this written consent, you declare that you have understood the information we have provided and consent to participate in this research study.

Kind regards,

Anne Pragt, Annabel Raven, Fleur de Reeper, Eef Houben, Isra Wahid and Viktoria Schulz
eef.houben@ru.nl

Consent form

for participation in the scientific research study on the effect of memes on health communication.

Thank you very much for taking part in our study and helping us!

Statement of participant

- The aim of the research study has been outlined to me.
- I was given the opportunity to ask questions regarding the research study.
- I participate voluntarily in the research study.
- I understand that I can stop at any point during the research study, should I wish to do so.
- I understand how the data of the research study will be stored and how they will be used.
- I agree that the data officer and designated data management staff of Radboud University may view my data.
- I understand that I have the right to withdraw my consent to the use of data from the study as describe in the information document
- I consent to participating in the research study as described in the information document.

I also agree that:

- the anonymised research data will be available for at least 10 years for review and reuse in future scientific research.

Survey questions

Demographic questions:

How would you describe yourself?

1. Female
2. Male
3. Non-binary/third gender
4. Prefer not to say
5. Prefer to self describe:

How old are you?

What level of formal education do you have?

Please indicate the highest educational qualification you hold. If none of the educational qualifications apply to you, please choose the one that is closest to your educational qualification.

1. No formal education or diploma
2. Primary education (elementary school or equivalent)
3. Lower secondary school (middle school or equivalent)
4. Upper secondary school (high school or equivalent)
5. Bachelor's degree or equivalent
6. Master's degree or equivalent
7. PhD, Doctor or higher

Pre exposure and prior knowledge questions

Are you familiar with anxiety and its symptoms?

1. Yes
2. No

How often do you use instagram?

1. Never
2. Rarely
3. Occasionally
4. Sometimes

5. Often
6. Frequently
7. Always

How often do you encounter health-related content on social media?

1. Never
2. Rarely
3. Occasionally
4. Sometimes
5. Often
6. Frequently
7. Always

Questions about the meme

To what extent do you agree with the following statements?

I find this meme funny:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

This post was informational:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

The information in this post was clear and educational:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

The creator of this post seems knowledgeable about anxiety:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I would trust this creator to provide accurate mental health information:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

Perceived knowledge

I feel more confident explaining anxiety to someone else after viewing this post.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree

7. Strongly agree

I understand how to recognise anxiety symptoms in myself or others.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

This post improved my understanding of anxiety causes.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I feel better informed about treatment options for anxiety.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

Emotions

I felt amused while viewing this meme.

1. Strongly disagree
2. Disagree

3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

This meme made me feel joyful.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I felt a sense of relief after viewing this meme.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

This meme made me feel reassured.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

This meme made me feel anxious.

1. Strongly disagree

2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I felt stressed while viewing this meme.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

This meme made me feel doubtful.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I felt frustrated after viewing this meme.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

Intentions

I am motivated to find out more about anxiety.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I am motivated to get more information about anxiety.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I will actively try to obtain more knowledge about anxiety.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I will talk to someone (spouse, friend, family member) about anxiety.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree

6. Agree
7. Strongly agree

I have the intention to search for more information about anxiety after seeing this meme

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

Stigma

An anxiety disorder is a sign of personal weakness.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

People with an anxiety disorder could snap out of it if they wanted to.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

People with an anxiety disorder do not make suitable employees.

1. Strongly disagree

2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

People with an anxiety disorder are to blame for their problem.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

People with an anxiety disorder are just lazy.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

People with an anxiety disorder are self-centred.

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

Attitudes

People with anxiety are a danger to others:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

People with anxiety are unpredictable:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

People with anxiety are hard to talk with:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

People with anxiety feel different from the way we feel at times:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree

6. Agree
7. Strongly agree

Brand Recall

I clearly remember the account that posted the meme I viewed earlier

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I can confidently recall the source of the meme I saw in this study

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

The brand or page that posted the meme is still fresh in my memory

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I could easily identify the source of the meme If shown a list of options

1. Strongly disagree
2. Disagree

3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I would recognise the account or brand if I saw it again

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

I remember the exact name of the account that posted the meme

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

Debrief

Thank you again very much for taking part in our survey. Below we have explained our research goals, procedures and your rights as a participants again:

Research purpose

We are investigating the influence of memes in health communication, particularly in perceived knowledge, your emotional responses, intentions, stigma that comes with anxiety, attitude, and brand recall. Memes are increasingly used in public health campaign, but their effects are still understudied. This study aims to fill this research gap by analysing

how memes from different sources and memes of different types affect people.

Data Use

Your Data will be used for scientific purposes only. The data was collected anonymously. Our research data may be of interest to other scientific research. The anonymized research data will therefore be available to other scientists for at least 10 years. Because the research data are anonymous, they cannot be traced back to you.

Transparency

We withheld the exact research focus initially to avoid biasing your responses. You are free to ask questions or raise concerns about any aspect of the study. You can contact us at eef.houben@ru.nl or Dr. Anna Wagner (anna.wagner@ru.nl)

Your contribution helps us a lot! Thank you for your time and openness!

Appendix B

The four different experimental conditions

Figure B1:

Informative meme and non-expert source



meme.anxiety

Follow



7 posts

0 followers

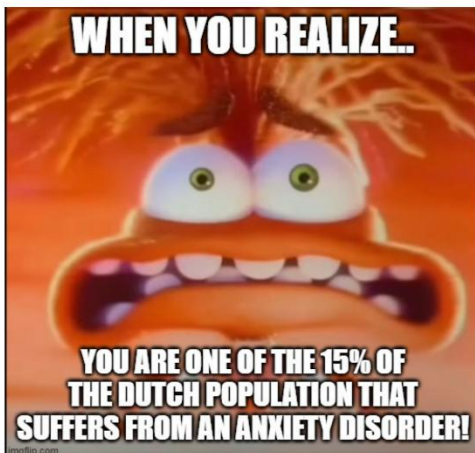
0 following

Memes

Here who you can read meme of every type enjoy!



meme.anxiety



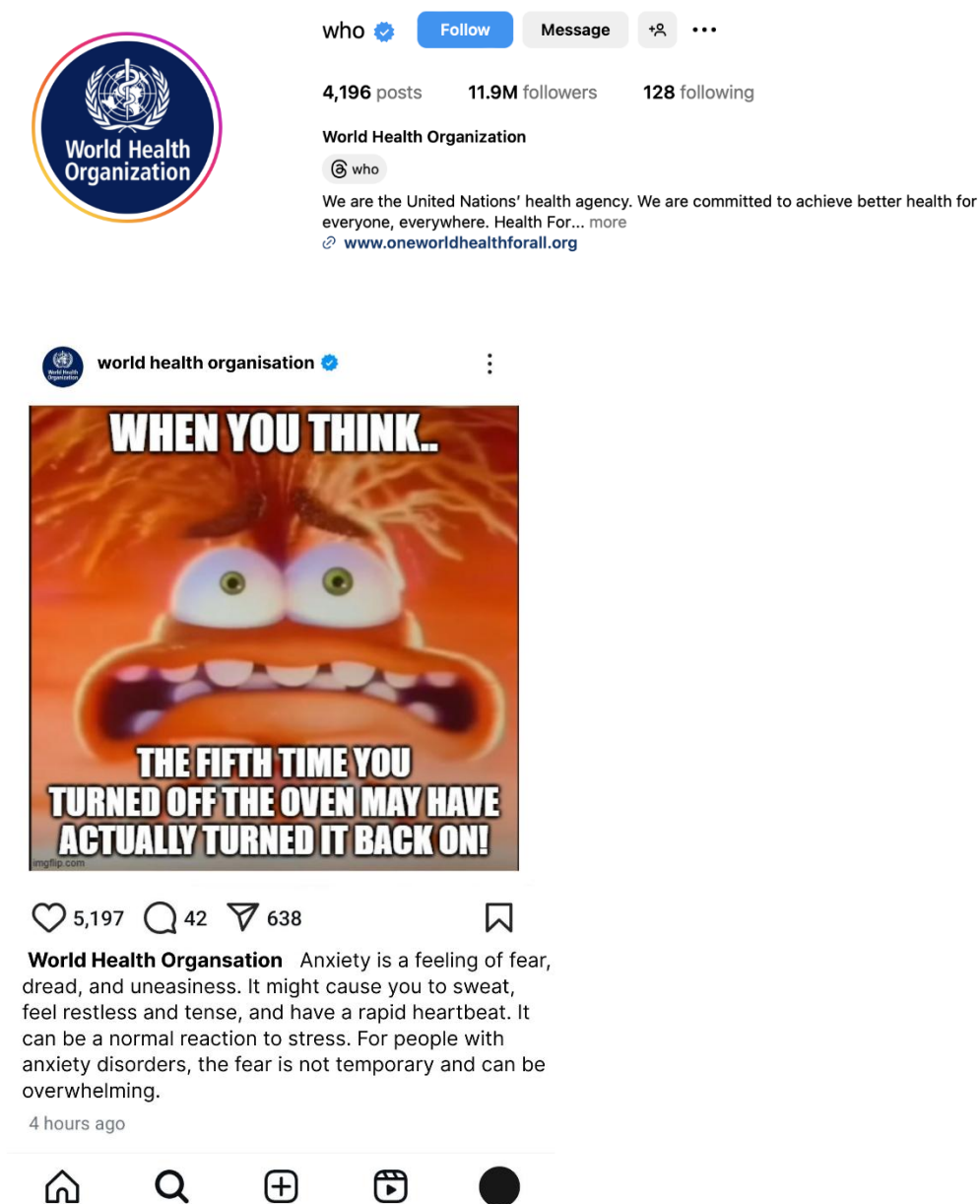
meme.anxiety Anxiety is a feeling of fear, dread, and uneasiness. It might cause you to sweat, feel restless and tense, and have a rapid heartbeat. It can be a normal reaction to stress. For people with anxiety disorders, the fear is not temporary and can be overwhelming.

4 hours ago



Figure B2

Humorous meme and expert source



The screenshot shows a social media profile for the World Health Organization (WHO). The profile includes a circular logo with the WHO emblem and the text "World Health Organization". Below the logo, it lists "4,196 posts", "11.9M followers", and "128 following". The bio states: "World Health Organization @who We are the United Nations' health agency. We are committed to achieve better health for everyone, everywhere. Health For... more www.oneworldhealthforall.org".

The main post is from "world health organisation" and features a meme with a red, angry-looking cartoon character. The text on the meme reads: "WHEN YOU THINK.. THE FIFTH TIME YOU TURNED OFF THE OVEN MAY HAVE ACTUALLY TURNED IT BACK ON!". Below the meme, there are 5,197 likes, 42 comments, and 638 shares. The caption reads: "World Health Organisation Anxiety is a feeling of fear, dread, and uneasiness. It might cause you to sweat, feel restless and tense, and have a rapid heartbeat. It can be a normal reaction to stress. For people with anxiety disorders, the fear is not temporary and can be overwhelming." The post was made "4 hours ago".

At the bottom of the screenshot, there is a navigation bar with icons for home, search, post, video, and profile.

Figure B3

Humorous meme and non-expert source



The screenshot shows a social media profile for "meme.anxiety". The profile picture is a circular image of a man with a shocked expression. The bio reads: "Memes Here who you can read meme of every type enjoy!". The profile lists "7 posts", "0 followers", and "0 following".



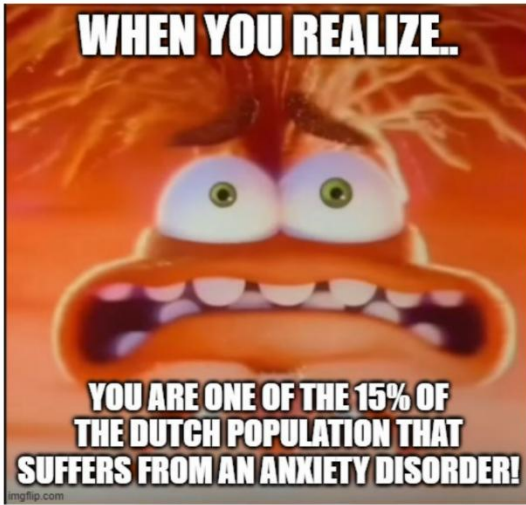
Figure B4

Informative meme and expert source





world health organisation



5,197 42 638

World Health Organisation Anxiety is a feeling of fear, dread, and uneasiness. It might cause you to sweat, feel restless and tense, and have a rapid heartbeat. It can be a normal reaction to stress. For people with anxiety disorders, the fear is not temporary and can be overwhelming.

4 hours ago



Appendix C

SPSS output pre-test

Figure C1

SPSS output pre-test: group statistics for perceived humorousness of the meme

Group Statistics					
	Meme Type (Humorous or Informative)	N	Mean	Std. Deviation	Std. Error Mean
To what extent do you think this meme is humorous? (the image itself, not the post caption)	Humorous	16	4,69	1,662	,416
	Informative	16	2,81	1,642	,410

Figure C2

SPSS output pre-test: independent samples *t*-test for perceived humorousness of the meme

Independent Samples Test											
		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Significance One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
To what extent do you think this meme is humorous? (the image itself, not the post caption)	Equal variances assumed	,459	,504	3,210	30	,002	,003	1,875	,584	,682	3,068
	Equal variances not assumed			3,210	29,996	,002	,003	1,875	,584	,682	3,068

Figure C3

SPSS output pre-test: effect sizes for perceived humorousness of the meme

Independent Samples Effect Sizes					
		Standardizer ^a	Point Estimate	95% Confidence Interval	
				Lower	Upper
To what extent do you think this meme is humorous? (the image itself, not the post caption)	Cohen's d	1,652	1,135	,377	1,877
	Hedges' correction	1,695	1,106	,368	1,829
	Glass's delta	1,642	1,142	,325	1,931

- a. The denominator used in estimating the effect sizes.
 Cohen's d uses the pooled standard deviation.
 Hedges' correction uses the pooled standard deviation, plus a correction factor.
 Glass's delta uses the sample standard deviation of the control group.

Figure C4

SPSS output pre-test: group statistics for perceived informativeness of the meme

Group Statistics					
	Meme Type (Humorous or Informative)	N	Mean	Std. Deviation	Std. Error Mean
To what extent do you think this meme is informative? (the image itself, not the post caption)	Humorous	16	3,44	1,999	,500
	Informative	16	4,56	1,788	,447

Figure C5

SPSS output pre-test: independent samples *t*-test for perceived informativeness of the meme

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
To what extent do you think this meme is informative? (the image itself, not the post caption)	Equal variances assumed	,913	,347	-1,678	30	,052	,104	-1,125	,670	-2,494	,244
	Equal variances not assumed			-1,678	29,633	,052	,104	-1,125	,670	-2,495	,245

Figure C6

SPSS output pre-test: group statistics credibility of the source

		Source (Non-Expert or Expert source)	N	Mean	Std. Deviation	Std. Error Mean
To what extent do you think this meme was provided by a credible source?	Non-Expert source		16	3,44	1,788	,447
	Expert source		16	3,69	1,887	,472

Figure C7

SPSS output pre-test: independent samples *t*-test on credibility of the source

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
To what extent do you think this meme was provided by a credible source?	Equal variances assumed	,224	,640	-,385	30	,352	,703	-,250	,650	-1,577	1,077
	Equal variances not assumed			-,385	29,912	,352	,703	-,250	,650	-1,577	1,077

Figure C8

SPSS output pre-test: group statistics trustworthiness of the source

		Source (Non-Expert or Expert source)	N	Mean	Std. Deviation	Std. Error Mean
To what extent do you find this meme trustworthy?	Non-Expert source		16	3,94	1,340	,335
	Expert source		16	3,50	1,789	,447

Figure C9

SPSS output pre-test: independent samples *t*-test on trustworthiness of the source

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
To what extent do you find this meme trustworthy?	Equal variances assumed	2,886	,100	,783	30	,220	,440	,438	,559	-,704	1,579
	Equal variances not assumed			,783	27,804	,220	,440	,438	,559	-,707	1,582

Appendix D

SPSS output main analysis

Figure D1

SPSS output: frequencies of gender over the whole sample

How would you describe yourself? - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	88	72,7	72,7	72,7
	Male	28	23,1	23,1	95,9
	Non-binary/ third gender	3	2,5	2,5	98,3
	Prefer not to say	1	,8	,8	99,2
	Prefer to self describe	1	,8	,8	100,0
	Total	121	100,0	100,0	

Figure D2

SPSS output: frequencies of education level over the whole sample

What level of formal education do you have? Please indicate the highest educational qualification you hold. If none of the educational qualifications apply to you, please choose the one that is closest to your educational qualification.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No formal education or diploma	1	,8	,8	,8
	Lower secondary school (middle school or equivalent)	4	3,3	3,3	4,1
	Upper secondary school (high school or equivalent)	64	52,9	52,9	57,0
	Bachelor's degree or equivalent	43	35,5	35,5	92,6
	Master's degree or equivalent	9	7,4	7,4	100,0
	Total	121	100,0	100,0	

Figure D3

SPSS output: descriptive test for age of participants

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
How old are you?	120	18	55	23,32	5,431
Valid N (listwise)	120				

Figure D4

SPSS output: Chi-Square test for the distribution of gender over the four conditions

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12,911 ^a	12	,376
Likelihood Ratio	13,150	12	,358
N of Valid Cases	121		

a. 12 cells (60,0%) have expected count less than 5. The minimum expected count is ,25.

Figure D5

SPSS output: Chi-Square test for the distribution of education level over the four conditions

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9,071 ^a	12	,697
Likelihood Ratio	9,491	12	,661
N of Valid Cases	121		

a. 12 cells (60,0%) have expected count less than 5. The minimum expected count is ,25.

Figure D6

SPSS output: one-way ANOVA for the distribution of age over the four conditions

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	21,425 ^a	3	7,142	,237	,870
Intercept	65286,675	1	65286,675	2170,671	<,001
Meme_condition	21,425	3	7,142	,237	,870
Error	3488,900	116	30,077		
Total	68797,000	120			
Corrected Total	3510,325	119			

a. R Squared = ,006 (Adjusted R Squared = -,020)

Figure D7

SPSS output: frequency test on the familiarity of anxiety

Are you familiar with anxiety and its symptoms?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	106	87,6	87,6	87,6
	No	15	12,4	12,4	100,0
	Total	121	100,0	100,0	

Figure D8

SPSS output: descriptive test for the pre-exposure and frequency of Instagram use

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
How often do you use Instagram?	121	1	7	5,36	1,522
How often do you encounter health-related content on social media?	121	1	7	4,02	1,384
Valid N (listwise)	121				

Figure D9

SPSS output: Reliability analysis of the four-item scale regarding negative attitudes

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,638	,641	4

Figure D10

SPSS output: group statistics for perceived humor of the meme

Group Statistics					
	Memetype	N	Mean	Std. Deviation	Std. Error Mean
To what extent do you agree with the following statements? I find this meme funny.	informative	60	3,58	1,476	,191
	humorous	61	4,26	1,482	,190

Figure D11

SPSS output: independent samples *t*-test for the perceived humor of the meme between the informative and humorous condition

Independent Samples Test											
		Levene's Test for Equality of Variances			t-test for Equality of Means						
		F	Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						One-Sided p	Two-Sided p			Lower	Upper
To what extent do you agree with the following statements? I find this meme funny.	Equal variances assumed	,008	,928	-2,524	119	,006	,013	-,679	,269	-1,212	-,146
	Equal variances not assumed			-2,524	118,981	,006	,013	-,679	,269	-1,212	-,146

Figure D12

SPSS output: effect sizes (Cohen's *d*) for the independent samples *t*-test on perceived humorousness

Independent Samples Effect Sizes						
		Standardizer ^a		Point Estimate	95% Confidence Interval	
					Lower	Upper
To what extent do you agree with the following statements? I find this meme funny.	Cohen's <i>d</i>		1,479	-,459	-,819	-,097
	Hedges' correction		1,489	-,456	-,814	-,096
	Glass's delta		1,482	-,458	-,822	-,091

- a. The denominator used in estimating the effect sizes.
 Cohen's *d* uses the pooled standard deviation.
 Hedges' correction uses the pooled standard deviation, plus a correction factor.
 Glass's delta uses the sample standard deviation of the control (i.e., the second) group.

Figure D13

SPSS output: group statistics for perceived informativeness of the meme

Group Statistics					
	Memetype	N	Mean	Std. Deviation	Std. Error Mean
MemelInfoTotal	informative	60	4,7833	1,20861	,15603
	humorous	61	4,3361	1,32829	,17007

Figure D14

SPSS output: independent samples *t*-test for the perceived informativeness of the meme between humorous and informative memes

Independent Samples Test											
		Levene's Test for Equality of Variances				t-test for Equality of Means				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
MemelInfoTotal	Equal variances assumed	2,290	,133	1,936	119	,028	,055	,44727	,23098	-,01010	,90464
	Equal variances not assumed			1,938	118,289	,028	,055	,44727	,23080	-,00977	,90431

Figure D15

SPSS output: group statistics for credibility of the source

Group Statistics					
	Sourcetype	N	Mean	Std. Deviation	Std. Error Mean
SourceTotal	expert	60	4,8500	1,34763	,17398
	non-expert	61	3,5410	1,25597	,16081

Figure D16

SPSS output: independent samples *t*-test for credibility of the source between expert source and none-expert source

Independent Samples Test											
		Levene's Test for Equality of Variances				t-test for Equality of Means				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
SourceTotal	Equal variances assumed	,056	,813	5,529	119	<,001	<,001	1,30902	,23678	,84018	1,77786
	Equal variances not assumed			5,525	118,107	<,001	<,001	1,30902	,23691	,83987	1,77817

Figure D17

SPSS output: effect sizes (Cohen's *d*) for the independent samples *t*-test between expert source and non-expert source on credibility

Independent Samples Effect Sizes					
		Standardizer ^a	Point Estimate	95% Confidence Interval	
				Lower	Upper
SourceTotal	Cohen's <i>d</i>	1,30222	1,005	,625	1,382
	Hedges' correction	1,31050	,999	,621	1,373
	Glass's delta	1,25597	1,042	,637	1,441

- a. The denominator used in estimating the effect sizes.
 Cohen's *d* uses the pooled standard deviation.
 Hedges' correction uses the pooled standard deviation, plus a correction factor.
 Glass's delta uses the sample standard deviation of the control (i.e., the second) group.

Figure D18

SPSS output: descriptive test of the two-way ANOVA on the effects of source type and meme type on attitudes

Descriptive Statistics

Dependent Variable: AttitudesT

Memetype	Sourcetype	Mean	Std. Deviation	N
informative	expert	2,9500	,92476	30
	non-expert	3,4167	1,02203	30
	Total	3,1833	,99455	60
humorous	expert	3,0833	1,08145	30
	non-expert	2,9516	,96051	31
	Total	3,0164	1,01537	61
Total	expert	3,0167	,99986	60
	non-expert	3,1803	1,01050	61
	Total	3,0992	1,00441	121

Figure D19

SPSS output: two-way ANOVA on the effects of source type and meme type on attitudes

Tests of Between-Subjects Effects

Dependent Variable: AttitudesT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4,374 ^a	3	1,458	1,462	,229
Intercept	1162,878	1	1162,878	1166,010	<,001
Memetype	,832	1	,832	,834	,363
Sourcetype	,848	1	,848	,851	,358
Memetype * Sourcetype	2,707	1	2,707	2,715	,102
Error	116,686	117	,997		
Total	1283,250	121			
Corrected Total	121,060	120			

a. R Squared = ,036 (Adjusted R Squared = ,011)